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A 60 000 year Greenland stratigraphic ice core chronology

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Abstract. The Greenland Ice Core Chronology 2005 (GICC05) is a time scale based on annual layer counting of high-resolution records from Greenland ice cores. Whereas the Holocene part of the time scale is based on various records from the DYE-3, the GRIP, and the NorthGRIP ice cores, the glacial part is solely based on NorthGRIP records. Here we present an 18 ka extension of the time scale such that GICC05 continuously covers the past 60 ka. The new section of the time scale places the onset of Greenland Interstadial 12 (GI-12) at 46.9±1.0 ka b2k (before year AD 2000), the North Atlantic Ash Zone II layer in GI-15 at 55.4±1.2 ka b2k, and the onset of GI-17 at 59.4±1.3 ka b2k. The error estimates are derived from the accumulated number of uncertain annual layers. In the 40–60 ka interval, the new time scale has a discrepancy with the Meese-Sowers GISP2 time scale of up to 2.4 ka. Assuming that the Greenland climatic events are synchronous with those seen in the Chinese Hulu Cave speleothem record, GICC05 compares well to the time scale of that record with absolute age differences of less than 800 years throughout the 60 ka period. The new time scale is generally in close agreement with other independently dated records and reference horizons, such as the Laschamp geomagnetic excursion, the French Villars Cave and the Austrian Kleegruben Cave speleothem records, suggesting high accuracy of both event durations and absolute age estimates.

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